

RCE Response  
U.S.S.N. 09/889,901  
Page No. 2 of 9

**IN THE CLAIMS:**

Please amend the claims as shown in the following claim listing.

**CLAIM LISTING:**

1-28. (Cancelled).

29. (New) A method of forming a hollow fiber membrane cartridge comprising the steps of:

- (a) selecting a hollow housing for the cartridge, said housing having an inlet and an outlet, said housing made from one or more thermoplastic perfluorinated resins;
- (b) forming a bundle from a plurality of hollow thermoplastic perfluorinated resin fibers, with the fibers oriented substantially parallel to the housing axis;
- (c) forming a potted bundle by contacting at least one end of the bundle with a molten thermoplastic perfluorinated potting resin, wherein the potting resin has a peak melting point at least 5°C below the peak melting point of the hollow fibers and a melt flow index of at least 100 g/10 min.;
- (d) cooling the potted bundle, and thereafter, reheating the bundle to a temperature above the peak melting point of the potting resin, but below the peak melting point of the hollow fibers, for a time sufficient to create a fluid-tight seal, free of voids, between the fibers and the potting resin; and
- (e) mounting the potted bundle in the housing with one or more thermoplastic perfluorinated resin end caps to form a hollow fiber membrane cartridge.

30. The method of Claim 29, wherein the potting resin has a peak melting point at least 10°C below the peak melting point of the hollow fibers.

RCE Response  
U.S.S.N. 09/889,901  
Page No. 3 of 9

31. The method of Claim 29, wherein the potting resin has a peak melting point at least 15°C below the peak melting point of the hollow fibers.

32. The method of Claim 29, wherein the potting resin has a peak melting point at least 25°C below the peak melting point of the hollow fibers.

33. The method of Claim 29, wherein the potting resin has a melt flow index of at least 150 g/10 min.

34. The method of Claim 29, wherein the potting resin has a melt flow index of at least 200 g/10 min.

35. The method of Claim 29, wherein the hollow fiber bundle comprises a membrane array consisting of a plurality of parallel thermoplastic, perfluorinated resin hollow fiber membranes, with a packing density of between 40 and 70%.

36. The method of Claim 35, wherein the packing density of the hollow fiber membrane array is between 45 and 65%.

37. (New) The method of Claim 35, wherein the one or more thermoplastic, perfluorinated resins of the membrane array and the potting resins are selected from the group consisting of homopolymers, copolymers, blends of one or more homopolymers, blends of one or more copolymers and blends of one or more homopolymers and copolymers of perfluorinated resins.

38. (New) The method of Claim 35, wherein the one or more thermoplastic, perfluorinated resins of the membrane array and the potting resins are selected from the group consisting of poly(TFE-co-PFAVE) resins and blends thereof.

RCE Response  
U.S.S.N. 09/889,901  
Page No. 4 of 9

39. (New) The method of Claim 35, wherein the array is formed prior to contacting said membranes with said potting resins by forming said membranes together in a spaced apart relation.

40. (New) The method of Claim 39, wherein the potting resin is a thin stream deposited in a defined zone near one end of said membrane array.

41. (New) The method of Claim 40, further comprising the step of contacting a second thin stream of potting resin near an opposite end of said array of membranes.

42. (New) The method of Claim 35, further comprising the step of spirally winding said array about an axis which is substantially parallel to a longitudinal axis of said membrane array while simultaneously applying said potting resin to the array of membranes to form circular bundle of fibers having at least one potted end.

43. (New) The method of Claim 42, further comprising the step of continuing to apply said potting resin after said circular bundle is formed to create a tubesheet of predetermined diameter about at least one end of said hollow fiber membranes.

44. (New) The method of Claim 29, further comprising the step of cutting at least one potted end of the bundle orthogonally to the longitudinal axis of said hollow fiber membranes to form said bundle with at least one flat end surface having exposed lumens.

45. (New) The method of Claim 29, wherein the bundle is mounted in said housing by fusion bonding.

46. (New) A method of making a hollow fiber membrane bundle consisting of

RCE Response  
U.S.S.N. 09/889,901  
Page No. 5 of 9

all thermoplastic perfluorinated resin comprising:

- a. forming a plurality of hollow fibers membranes formed of one or more thermoplastic perfluorinated resins into a substantially parallel arrangement wherein the fibers are arranged in parallel arrangement along a length of the fibers; then
- b. winding the plurality of hollow fibers about an axis which is substantially parallel to the length of the hollow fiber membranes so as to form a bundle having two bundle ends; and
- c. simultaneously with step (b), extruding a molten stream of a perfluorinated thermoplastic resin having a peak melting point at least 10°C below the peak melting point of the hollow fiber membranes and having a melt flow index of at least 150 g/10 min. and directing said resin onto at least one of the two bundle ends to thereby pot one or more ends in said resin;
- d. cooling the bundle;
- e. reheating the cooled bundle at the one or more potted ends to a temperature at or above the peak melting point of the resin of the stream but below the peak melting point of the hollow fibers to eliminate voids in said potted ends; and
- f. exposing the lumen ends of the hollow fiber membranes at one or more potted bundle ends to communicate with the exterior of the bundle.

47. (New) The method of Claim 46, wherein both ends of the bundle are potted with the molten stream of the perfluorinated thermoplastic resin.

48. (New) The method of Claim 46, wherein both ends of the bundle are potted with the molten stream of the perfluorinated thermoplastic resin and wherein both ends of the bundle are exposed so that the lumen ends of the hollow fiber membranes can communicate with the exterior of the bundle.

49. (New) A hollow fiber membrane cartridge including a bundle of potted

RCE Response  
U.S.S.N. 09/889,901  
Page No. 6 of 9

hollow fiber membranes, made by the method of Claim 29, wherein the potting materials and the hollow fibers are made from different thermoplastic, perfluorinated resins.

50. (New) A hollow fiber membrane cartridge including a bundle of potted hollow fiber membranes, made by the method of Claim 46, wherein the potting materials and the hollow fiber membranes are made from different thermoplastic, perfluorinated resins.

51. (New) The method of Claim 46, further comprising the steps of:

- g. inserting the bundle into a housing, said housing having a first and second end and a cylindrical housing interior being suitably shaped to contain the membrane bundle, a first means for sealing the first end of the bundle to the interior of the housing adjacent its first end, a second means for sealing the second end of the bundle to the interior of the housing adjacent its second end, the housing having one or more means for dividing the bundle into at least two regions including a shell side space exterior to the portion of the bundle between the potted ends and a space including the lumens; then
- h. applying a first end cap adjacent the first end of the housing to seal the first housing end; then
- i. applying a second end cap adjacent the second housing end so as to seal the second housing end; and
- j. providing a shell side access in the housing and at least one access in at least one of the first or second end caps.

52. (New) A hollow fiber membrane cartridge including a bundle of potted hollow fiber membranes made by the method of Claim 51, wherein the potting materials and the hollow fiber membranes are made from different thermoplastic, perfluorinated resins.

RCE Response  
U.S.S.N. 09/889,901  
Page No. 7 of 9

53. (New) A method according to Claim 46, wherein the potting compound has melt flow index of at least about 200 g/10 mins.

54. (New) A method of forming a hollow fiber bundle consisting of all thermoplastic, perfluorinated resin comprising the steps of:

forming a substantially parallel array of hollow fiber membranes, wherein said membranes are formed of one or more thermoplastic perfluorinated resins, and have a packing density of from 45 to 65%;

forming one or more strips of potting material formed one or more thermoplastic perfluorinated resins along one or more portions of the array, wherein the potting material has a peak melting point at least 5°C below that of the hollow fiber membranes,

winding the array upon itself in order to form a bundle,

heating said bundle to a temperature below the peak melting point of the hollow fibers and above the peak melting point of the one or more strips of potting material for a period sufficient to form a fluid-type seal free of voids between the potting material and the hollow fiber membranes.

55. (New) The method of Claim 54, wherein the one or more thermoplastic perfluorinated resins of the hollow fiber membranes and the potting material are selected from the group consisting of poly(tetrafluoroethylene-co-perfluoro (alkylvinylether)), poly(tetrafluoroethylene-co-hexafluoropropylene) and blends thereof.

56. (New) The method of Claim 54, wherein the one or more strips of potting material is applied to the array of fibers as a molten stream.

57. (New) The method of Claim 54, wherein the one or more strips of potting material is applied to the array of fibers as a solid, preformed tape.